LAGA
A FEW FACTS

Around **90** permanent researchers and teachers -researchers (including around 10 CNRS researchers)

7 administrative staff

60 doctoral students, around 30 foreign visitors and post-docs

Around **200** publications per year, including numerous articles in the most prestigious international mathematical journals

• Prizes and awards: :
a Fields Medal 2010 awarded to a former LAGA member, a Clay research award in 2011, an INPI prize for innovation in 2012,

4 members of IUF - Institut Universitaire de France (in 2011, 2015, 2016)

• LAGA is taking part in **3** Labex (laboratories of excellence) and around 20 industrial of institutional contracts

A FEW WORDS :

With 7 research teams and a transversal axis, we cover a large part of the spectrum of contemporary mathematics, from the most fundamental to the most applied. Our research fields include arithmetic geometry, algebraic topology, ergodic theory and dynamical systems, mathematical physics and partial differential equations, probability theory and stochastic modeling, scientific computing, modeling in engineering and life sciences, image and information processing.

Conception : direction de la communication - impression : reprographie centrale Université Paris 13 - Février 2017

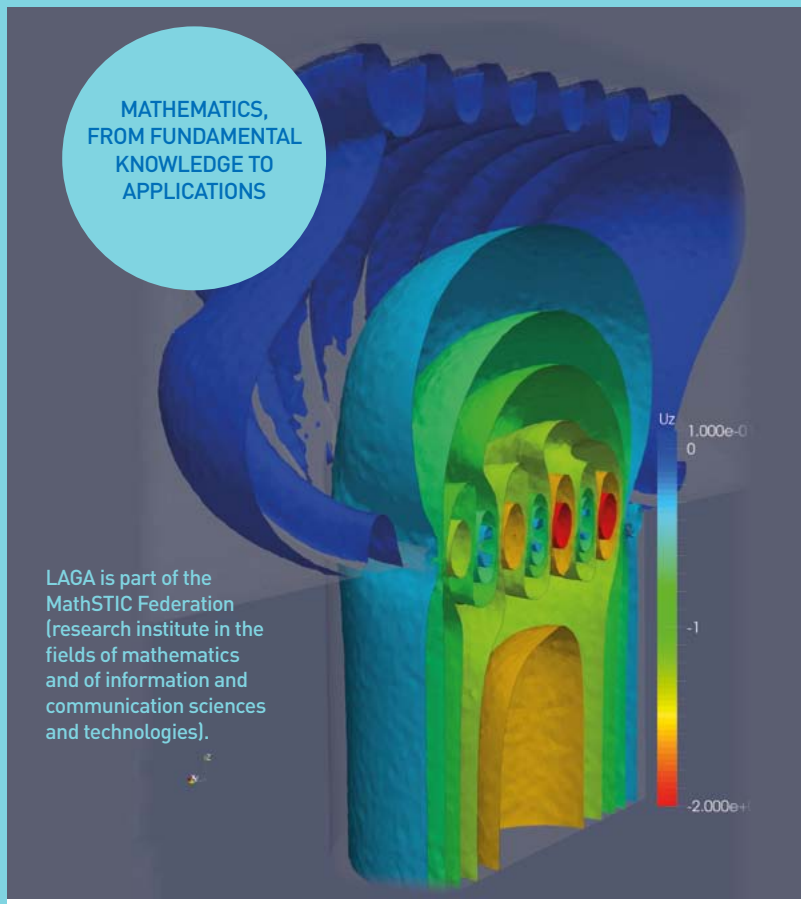
Institut Galilée

UNIVERSITE PARIS 13

LAGA

LABORATORY ANALYSIS, GEOMETRY AND APPLICATIONS — UMR CNRS 7539

MATHEMATICS, FROM FUNDAMENTAL KNOWLEDGE TO APPLICATIONS



LAGA is part of the MathSTIC Federation (research institute in the fields of mathematics and of information and communication sciences and technologies).

cnrs

www.math.univ-paris13.fr

L'Université Paris 13 est membre de :
USPC Université Sorbonne Paris Cité
CAMPUS CONDORCET Paris-Aubervilliers

RESEARCH TEAMS AND AXES

AGA : ARITHMETIC AND ALGEBRAIC GEOMETRY

The main subjects of the team concern the Langlands program which consists in a general and partially conjectural framework between representations of classical groups and those of Galois groups. This program possesses, through the various cohomological theories, a geometric incarnation which has recently received a new perfectoid perspective.

MTII : IMAGE PROCESSING AND PROTECTION OF INFORMATION

The team has two axes : information protection and image analysis. In image analysis, their work includes domains such as video analysis and tracking (on regular videos and depth videos), skeletonization algorithms for shape analysis, and 3d+t image analysis for medical applications. The information protection axis (whose team is located at University Paris 8, co-guardianship of LAGA) is interested in cryptology (which deals with encrypting, decrypting, authenticating, electronically signing messages, securing the cloud) and error correcting codes (which allow detecting / correcting errors when storing or sending messages, contributing to managing big data). They use and develop mathematical tools related to finite fields, like Boolean functions and Galois theory.

MCS : MODELING AND SCIENTIFIC COMPUTING

The team has a wide spectrum of activities, including the analysis of nonlinear partial differential equations, model coupling, control theory, the development of innovative numerical algorithms and high performance computing (domain decomposition, error estimation, adaptive mesh refinement). Its members are involved in numerous collaborations, within the academic world (University Paris 13, France or abroad), as well as with industrial partners. The application fields cover medicine, plasma physics, flows in porous media, oceanography, electromagnetism, ...

PMEDP : MATHEMATICAL PHYSICS AND PARTIAL DIFFERENTIAL EQUATIONS

The team works on problems of long time existence, asymptotic behavior and blow-up for solutions of nonlinear evolution partial differential equations (wave, Schrödinger, reaction-diffusion equations, equations from fluid mechanics,...). It focuses as well on issues of mathematical physics related to spectral theory, and on questions of geometric analysis.

PS : PROBABILITY AND STATISTICS

The team is working in broad areas in stochastic processes (trees and random walks, branching and fragmentation-coagulation processes, SPDE, Malliavin calculus, random models in biology or related to combinatorics), as well as in mathematical finance, numerical probabilities (in particular Monte Carlo method), and in statistics (statistical modeling, sample analysis, estimation and identification, Markov chain)

TESD : ERGODIC THEORY AND DYNAMICAL SYSTEMS

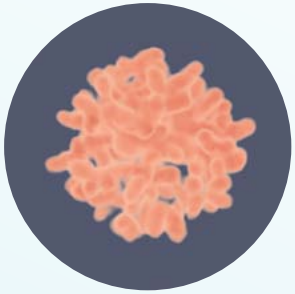
The team studies various aspects of dynamical systems: ergodic, geometric and topological properties of important classes of systems such as interval exchanges, endomorphisms of complex manifolds, iterated functions systems, etc..., as well as generic properties (i.e. satisfied by "almost all" systems). It also works at the interface of other branches of mathematics, namely group theory, probability, number theory and mathematical physics.

TA : ALGEBRAIC TOPOLOGY

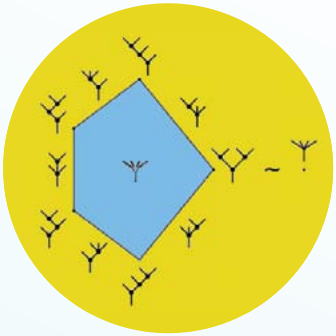
The members of the algebraic topology team are working in highly active areas of research, including homotopical algebra, stable homotopy theory, algebraic K-theory, algebraic groups and quantum groups. The team organizes regular seminars and workshops on these themes.

TRANSVERSAL AXIS MDV : MATHEMATICS FOR LIFE SCIENCES

The members of this transversal axis belong to several teams of the laboratory (MCS, PS, MTII, PMEDP). In particular, this axis is strongly tied to the Inflamex Labex, an excellence network linking several medical and biology teams of SPC. We have a large variety of research subjects in this axis: modeling and predictive diagnosis for immune and inflammatory diseases, modeling and optimization of vascular prostheses (stents) and biofilms, identification of therapeutic targets for new drug design, chemotaxis and tumor growth, modeling of the brain aging, ionic phenomena for cell division, epidemic dynamics, medical imaging and 3d-reconstruction of living cells.



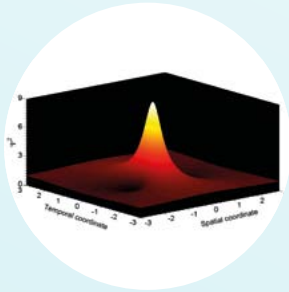
3D reconstitution
of a living cell
(Jiaping Wang)



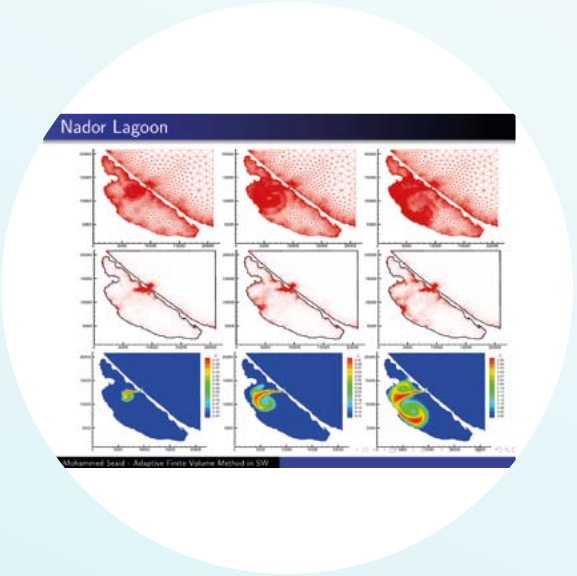
A Stasheff associaedron
in homotopy theory
(Bruno Vallette)

Automatic decomposition (on the right) of a shape (on the left)
using a curvilinear skeleton (middle) (John Chaussard)

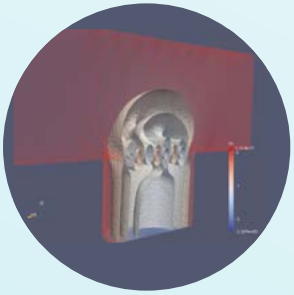
Image of the interior
of a resoluble
3-manifold, solving
a problem posed by
Thurston (Pierre Berger)



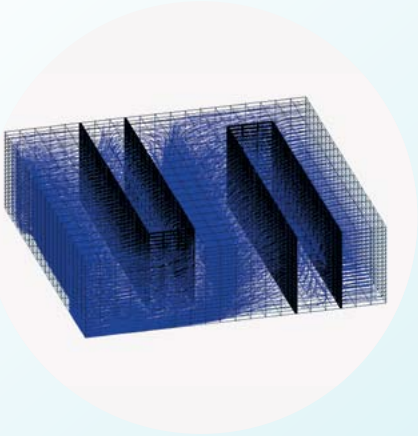
A soliton solution
of the nonlinear cubic
Schrödinger equation
in three dimensions
(Thomas Duckaerts)



Mathematical
and numerical modeling
of the blood flow
in a stent (Vuk Milisic)

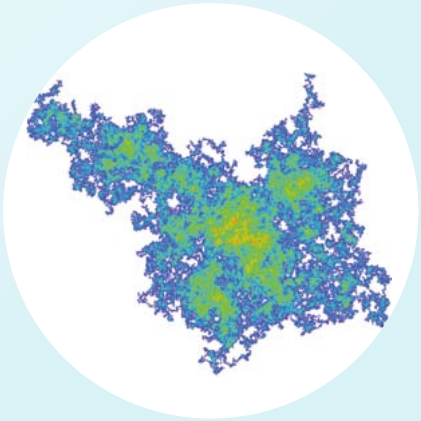


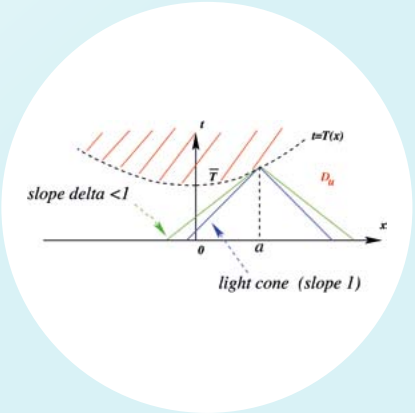
Sediment transport in a lagoon, numerical simulation
by an adaptive finite volume scheme (Fayssal Benkhaldoun
and Mohamed Seaid)



Time-space domain decomposition for a two-phase immiscible flow (Elyes Ahmed)

Simulation of a reinforced random walk (Laurent Tournier)





The blow-up surface for a nonlinear wave equation at a non characteristic point (Hatem Zaag)

VILLETANEUSE CAMPUS

ACCESS

Local train (ligne H) from Gare du Nord (Epinay-Villetaneuse station) + bus 156 or 361 or Tramway T8 from Saint-Denis ;
By car enter parking P3

CONTACT

LAGA - Institut Galilée - Batiment B - 4ème étage
99 avenue Jean-Baptiste Clément - 93430 Villetaneuse
Tél. : +33 1 49 40 36 18 - secre2_laga@math.univ-paris13.fr